STRESS AND PURITY CRISTALLINITY OF CVD DIAMOND FILMS GROWTH IN HOT FILAMENT REACTOR ON TI6AL4V ALLOY WITH VARIOUS METHANE CONCENTRATION

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Abstract

CVD diamond film on the surface of Ti6Al4V alloy will increase its lifetime. The diamond films were deposited in hot filament reactor with various methane and hydrogen concentration, in order to study the adherence between film and substrate. Raman Scattering Spectroscopy evaluated film quality, purity cristallinity and total stress. Thermal stress was evaluated from the calculus of thermal expansion coefficient of the film and of the alloy from room temperature to growth temperature. Intrinsic stress was calculated considering the difference between the total and the thermal stresses. Adherence tests were done with indentation technique and studied by Scanning Electron Microscopy. Its can observe a strong dependence with the sample preparation technique. Best results in terms of the film quality are obtained for a methane concentration ranging from 0.5% vol. to 1.0% vol. in hydrogen. The diamond films obtained have compressive stress and good adherence.

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